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ABSTRACT

Three experiments were conducted to determine how children assign meaning to a multiple-meaning word in a sentence context. Fourth-grade children were given sentences in which a key word carried a meaning other than its "primary," or most familiar, meaning. Two types of multiple choice questions could then follow: in the first type, the secondary, or "correct" meaning, and the primary were among the choices. The second type had only the secondary meaning among the choices. Findings show that when the primary meaning was among the choices, it was chosen by the children, even when it was inappropriate to sentence context and the children knew the secondary meaning. This would indicate that children were not attending to sentence context, but to individual words. They correctly chose secondary meaning when it appeared without the primary meaning. Training was then conducted to determine which of two methods was more effective for teaching meaning: teaching contextualization or teaching individual words. Findings show the former to be better. Two explanations are offered: (1) grade-school reading instruction focuses more on individual words rather than extended discourse, making contextualization difficult; and (2) ability to contextualize may be due to the child's knowledge of different meanings of a word. Thus, context training is more effective for meaning learning. (PJM)

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Polysemous Words and Sentence Comprehension: A Follow-Up Study

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Polysemous Words and Sentence Comprehension:

A Follow-up Study

In a previous study of word meanings, Mason, Kniseley, and Kendall (1979) showed that when children are asked to choose the best meaning of an underlined word in a sentence, they most often select the primary meaning even when the sentence context indicates that a secondary meaning is correct. For example, many children who were asked to select the correct meaning of "bound" in the sentence, "The dog can bound after the stick," chose "tied" rather than "leap." Since "tied" is the primary meaning of "bound," it was thought that children chose the alternative that matched the most familiar meaning of the lexical item rather than the one required by the semantic or syntactic context of the sentence. This suggests that they attended only to the underlined word instead of attending to the entire sentence.

This attention solely to the underlined word may be due to inflexibility; that is, they may have selected the most frequent (familiar) meaning because they did not consider any other meanings. On the other hand, they may have attended only to the underlined word and selected its most frequent meaning because they did not know how to use sentence context.

Either of these interpretations indicates that children are not comprehending text as fully as possible. They lead to very different remediation, however. Children who inflexibly select a word's primary meaning need to be taught to consider other possible meanings of that word. Children who do not take advantage of sentence context to help them determine whether the primary or secondary meaning is correct ought to be taught to use context.

Experiment I. A first step to constructing materials was to be sure that the secondary meanings were known; for this, we tested three classes of fourth graders. These results also provided base-line data against which other re-

sul s could be compared. Each of the 38 sentences in the test supported the sec ndary meaning of a target word (Secondary Meanings Test: SMT). The target words were 18 words used in our previous study plus 20 other polysemous wor s that university students had identified as having a strong primary mea ing. Four multiple choice foils were created; however, the primary meaning was excluded so that we could determine whether children knew the secondary mea ing without being confused by a primary meaning foil. An example test ite is: Her dress was a deep rose. (a) satin (b) bird (c) skirt (d) pink (We omitted the primary meaning, flower, for the item.)

These base-line results showed that students correctly identified 24.7% of the target words (SD =7.8). Five words which were recalled by fewer than 50% of the children (e.g., log to mean book, cane as plant, and rent as tear) and one which had been mistyped were discarded. The remaining 32 words, all but one of which was recognized by at least 54% of the children, served as materials for the remaining two experiments. Using these sentences, we constructed two forms of the same test in which foil type was varied: on form A, the primary and secondary meanings were present in the foils for 16 sentences (group 1) while only the secondary meaning was present for the other 16 sentences (group 2). Form B had the opposite arrangement: only the secondary meaning was present for the 16 group 1 sentences, and both the primary and secondary meanings were present for the 16 group 2 sentences.* We did this so that each child could act as his own control in the determination of distractibility by the primary meaning.

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* For Secondary meaning foil types, all foils were identical to those in the SMT test. For secondary and primary foil types, one of the distractors was deleted and the primary meaning substituted; thus 3 of the 4 foils were like those on the STM.

Experiment II. The 32 sentence test was given to three classrooms of grade 4 children, 52 children in all, who were randomly assigned to test form. They read each of the 32 sentences and chose the foil that they thought meant about the same thing as the target word. No time limit was imposed. A repeated measures ANOVA was used to evaluate the results; foil type (primary and secondary - P/S, and secondary - S) was one factor, and groups (children given Form A or Form B) was the other. Results showed no significant difference between groups, F (1, 50) = .11, p = .74, $\bar{x}_{GpA}$ = 12.23, $\bar{x}_{GpB}$ = 11.98, but a highly significant difference between foil types, F (1, 50) = 22.5, p = .000, $\bar{x}_{p/s}$ = 11.44, $\bar{x}_{s}$ = 12.77. There was also a significant interaction between groups and foil type, F (1, 50) = 11.36, p = .002 (see Figure 1). The significant difference between foil types confirmed our previous findings; children appeared to be distracted by the primary meaning when it was available, even though it was inappropriate in the sentence. The interaction determined that the effect was stronger for Group 2 than for Group 1. Pairwise comparisons of means using the Tukey HSD procedure showed that group 2 did significantly more poorly with P/S than S foils; they also performed significantly less well than did group 1 with the P/S foil type.

These results again suggested that children were not paying attention to sentence context or were not considering another meaning of a word. To evaluate these possible explanations for our findings, Experiment III was set up.

Experiment III. Two treatment conditions were carried out eight weeks after Experiment II with the same grade 4 children. In the first condition we planned to emphasize the secondary meaning of certain words so that the children would have another meaning readily available. In the second we planned to encourage the children to use context clues.

Our meaning training procedures were based on Bull and Wittrock's (1973) study of learning verbal definitions. Their procedures drew from work by Wittrock (1966) which more recently has been expanded to the generative model (Wittrock, 1974) and by Paivio (1971). In our study we wrote a word on the board and discussed the secondary meaning used in the test; we did not mention the foil term, however. Following the generative model we then asked 2 or 3 children to use the word in a sentence which related a personal incident. For example, with the word case one child explained that his brother had been involved in a law case because of a speeding ticket. We then had each child write the word on a page in a booklet and draw a picture of a case with which he was familiar (from personal experience or from TV). In this way we hoped to encourage each child to use both generative processing and imagery strategies and thus make our meaning training procedures more effective.

Our procedures for the context training condition were based on what is recommended for cloze training (Jongsma, 1971) and on concept development (e.g., Engelmann, 1969). We used a nonsense word (glurk) in a different position in eight sentences: The soldiers glurked the king. Our glurks moved to a new house. Each sentence was shown individually on an overhead projector, and we asked the children to tell what glurk might mean in the sentence and why, and what glurk could not mean and why.

The children were randomly assigned to the two treatment conditions, and treatments were carried out in separate rooms. There were 26 children in each group. After the training sessions the children were given a cloze task to perform to prevent the meaning training group from merely recalling the definitions taught from short term memory. After working 7 minutes on the cloze task, the same test used in Experiment II was given to the children as a posttest. They were allowed to work through it at their own pace.

Since there was time for only one training session in the school, we had to limit the number of words whose secondary meanings were discussed with the children. There were sixteen words which did not show ceiling effects (with S foils, MDn = 69%, range = 37 - 93%; with P/S foils, Mdn = 56%, range = 22 - 89%). We selected 8 of these for discussion and then had 8 others for comparison. In the following subjects analyses, only responses related to these 16 words are considered.

Subjects Analyses: A 2 x 2 repeated measures ANOVA was performed with foil type (P/S and S) and group (A and B) as factors. Because there was no main effect of group, we collapsed across that factor and reorganized the data to analyze the effects of foil type and treatment. This analysis showed a significant effect of foil type, $\underline{F}$ (1, 50) =8.92, $\underline{p}$ =.004, $\bar{x}_{P/S}$ = 5.54, $\bar{x}_{S}$ = 6.31, no significant effect for treatments, $\underline{F}$ (1, 50) = .70 , $\underline{p}$ = .41 , $\bar{x}_{C}$ = 6.12, $\bar{x}_{M}$ = 5.73, and no significant interaction, $\underline{F}$ (1, 50) = .80, $\underline{p}$ = .37. The significant difference between foil types indicated that the children got more items correct with S foils; they again seemed to be distracted by the presence of the dominant meaning.

We had predicted that context training would encourage the children to use the context to select the appropriate meaning of the target word and that they therefore would not select the more familiar primary meaning; we thus expected no difference in the number of correct items with either foil type. A post-hoc analysis of simple effects demonstrated that this in fact is what happened: the significant main effect of foil type was due to the meaning training group who still appeared to be distracted by the primary meaning.

However, since the meaning training group could be taught only eight of the 16 words tested, the appropriate comparison for that group was the 8 words taught with the 8 which were not taught. Because the words taught were not

distributed equally across the two forms, the analysis of variance was done on proportions. There were no differences between the words taught and not taught, F (1, 50) = .38, p = .54, but there was still a significant effect of foil type, F (1, 50) = 8.80, p = .005. The meaning-trained students again did better with S foils; they still appeared to be distracted by the primary meaning even though the secondary meaning had been emphasized. There was no interaction between teaching and foil type, F (1, 50) = .02, p = .89.

Analysis by Words: To gain some insight into the effect of training on the word knowledge of each of the treatment groups, we looked at the percent of children who knew each word before and after training. Because there were a different number of children in Experiment I and II, percentages are reported.

Percent correct scores shown in Table 1 serve to clarify the results described previously. In Experiment II there was a 12% difference between percentages for P/S versus S foils. In Experiment III, some improvement in knowledge of word meanings is apparent for both the Meaning and Context groups. However, for the Context group the difference between foil types is only half what it was before training (6%), while for the Meaning group the difference is still the same (13%).

To try to better understand this difference we determined the percent of children who chose the primary distractor in P/S foils. In Experiment I, 17.03% of children did so; after training 15.37% of children in the Meaning Group but only 8.97% of children in the Context Group did, again showing the effect of the context training in encouraging the children to pay attention to sentence meaning rather than to individual word meaning.

In comparing the 8 words taught with the 8 not taught for the Meaning Group (Table 2), the effect of the distractibility of the primary meaning in the P/S foils is again apparent. The words taught appear to be somewhat more

difficult than the words not taught; this is true when the words are compared within Experiment II and with results from Experiment I. However, after these words' secondary meanings were discussed with the children there was still some growth for both foil types; there was no increase for the words not taught.

Another way of evaluating the effectiveness of the two training conditions is to compare the percent change after training for P/S and S foil types (Table 3). When P/S foils are considered, both the meaning and context groups made a large improvement on the trained words; on untrained words, there was little or no improvement by the meaning group, but again a large improvement by the context group. These same trends are evident for the S foils. This again points to the efficiency as well as the effectiveness of context training. That is, context training seems to generalize to all or most words on the test, while the effect of meaning training is specific to the words taught.

It might be argued that the improvement on these 16 more difficult words is simply regression toward the mean. To examine this possibility we also looked at the 16 words on which there was a ceiling effect in Experiment II (Table 4). There does seem to be some regression for the meaning group as there is a negative percent change for both foil types. However, the change is positive for the context group, again suggesting the facilitating effect of context training.

Discussion

The results of Experiment I described here confirm the finding from our previous study. The children appeared to be distracted when the primary meaning was available to them, even when it was inappropriate to sentence context.

In Experiments II and III we again replicated the findings of both Experiment I and our previous study regarding children's distractibility by the

primary meaning. We also confirmed that the majority of children knew the secondary meaning; thus the effects are not due simply to children's lack of knowledge of the meanings but rather to their inattention to sentence context. Our context training procedure was an effective way of getting children to pay more attention to context to determine which words make sense and which don't. While children in the context group were not trained on any of the words tested, they selected the correct meaning more often than did the meaning training group and were not distracted by the primary meaning.

Even though we planned what we believed to be an optimal training procedure, the finding that the meaning training procedure was not particularly effective is not unusual (Jenkins, Pany & Schreck, 1978). An inspection of the booklets in which the children drew gave some insight into one reason for this lack of effectiveness. Some children continued to use a word's primary meaning; their pictures were congruent with the primary meaning, even though the secondary meaning had just been discussed. Others merged primary with secondary meanings. For example, at least two children pictured a long train on a person's skirt but showed the person saying "choo-choo."

There are two possible explanations for our findings. First, they may simply reflect an effect of context. Reading instruction in the primary grades focusses more heavily on words than on connected discourse. It may be that the grade 4 children in our study have had insufficient training on using sentence context and thus attend instead to individual words.

On the other hand, children's ability to use sentence context when faced with secondary meanings may depend on the extent of their knowledge of different meanings of a word. When children firmly know both the primary and secondary meanings, they may not be distracted by the primary meaning when the secondary is cued by the context. However, as they are acquiring a secondary

meaning, they do seem to be distracted and don't attend to sentence context. Thus, the firmness of a child's knowledge of the secondary meaning of a polysemous word should guide the teacher in deciding whether or not he needs to be reminded to attend to sentence context.

We don't mean to suggest that teaching word meanings is never effective. Obviously a child needs to be made aware of a new meaning. However, in the present study we looked only at words with which children had some familiarity. It is in this situation that context training appears to be more effective than meaning training.

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Table 1

Percent of Children Selecting the Correct Meaning, by Foil Type (16 words)

	Experiment II	Experiment III	
		Context Group	Meaning Group
P/S Foils	55.8	72.7	63.7
S Foils	67.4	79.1	77.2

Table 2

Percent of Children in the Meaning Group Selecting the Correct Meaning, by Foil Type (16 words)

	Experiment II	Experiment III	(Experiment I) SMT
Words Taught			
P/S Foils	51.38	69.38	
S Foils	62.13	81.63	67.71
Words Not Taught			
P/S Foils	53.25	58.40	
S Foils	72.60	72.75	69.75

Table 3

Percent Change After Training (16 words)

P/S Foils

Percent change	Meaning training	Context training
Trained words	+ 11.0	+ 14.9
Untrained words	+ 4.8	+ 19.9

S Foils

Percent change	Meaning training	Context training
Trained words	+ 19.5	+ 14.8
Untrained words	+ .1	+ 8.6

Table 4

Mean Percent Change After Training

(16 words not included in Experiments II and III)

Percent change	Meaning training	Context training
P/S Foil	- 7.1	+ 2.2
S Foil	- 4.1	+ 3.8

Figure 1

Interaction between Groups and Foil Type, Experiment I